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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/998,277	11/30/2001	Ned T. Stetson	HS-109	6717

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EXAMINER
COMBS, JANELL A

ART UNIT	PAPER NUMBER
1742	

DATE MAILED: 04/09/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/998,277	STETSON ET AL.
	Examiner	Art Unit
	Janelle Combs-Morillo	1742

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 November 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a)☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2, 5-8, and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Bernauer et al (J. Less-Common Metals) or "Compilation of IEA/DOE/SNL Hydride Databases" (hereinafter Hydride Database).

The instant invention (claim 1) recites a composition: $Ti_{0.55-1.1}Zr_{0-0.35}A_{0.3-1.8}Mn_{0-1.8}$, which converts to-

given numbers	min	max
Q	0.9	1.1
X	0	0.35
Y	0.3	1.8
Z	1.8	2.1

	ratios		atomic%	
element	min.	max.	min at%	max. at%
Ti	0.55	1.1	12.2%	78.6%
Mn	0	1.8	0.0%	67.9%
Zr	0	0.35	0.0%	29.2%
A	0.3	1.8	8.5%	76.6%

Table 1 (alloy from claim 1)

Bernauer and Hydride Database teach a hydrogen storage material with a composition- $Ti_{0.98}Zr_{0.02}V_{0.43}Fe_{0.09}Cr_{0.05}Mn_{1.5}$, which converts to 51.3wt%Mn, 29.2wt% Ti, 13.6wt% V, 3.1wt% Fe, 1.6wt% Cr, and 1.1wt% Zr, or in atomic %- 48.9at% Mn, 31.9at% Ti, 13.99at% V, 2.9at% Fe, 1.6at% Cr, and 0.63at% Zr, which falls within the presently claimed composition ranges (claims 1 and 2).

Concerning dependent claim 5, where Y ranges 0.6-1.2:

given numbers	min	max
Q	0.9	1.1
X	0	0.35
Y	0.6	1.2
Z	1.8	2.1

	ratios		atomic%	
element	min.	max.	min at%	max. at%
Ti	0.55	1.1	15.3%	64.7%
Mn	0	1.5	0.0%	56.6%
Zr	0	0.35	0.0%	23.3%
A	0.6	1.2	16.9%	68.6%

Table 4 (alloy from claim 5)

Concerning dependent claim 6, where Y ranges 0.7-1.0:

given numbers	min	max
Q	0.9	1.1
X	0	0.35
Y	0.7	1
Z	1.8	2.1

	ratios		atomic%	
element	min.	max.	min at%	max. at%
Ti	0.55	1.1	16.7%	61.1%
Mn	0	1.4	0.0%	52.8%
Zr	0	0.35	0.0%	21.9%
A	0.7	1	19.7%	64.5%

Table 5 (alloy from claim 6)

Therefore it is apparent that the composition taught by Bernauer falls within the instant ranges.

Concerning dependent claims 7 and 8, the Hydride Database reference teaches that said alloy is nearly single phase C14 (AB2) type of hydrogen storage alloy.

Concerning dependent claim 23, Hydride Database teaches that said alloy can be in powder form (see second page).

3. Claims 1-4, 7, 8, 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Nakamura et al (US 5,851,690 A).

As stated in Table 6 below, Nakamura teaches a Ti-Zr-Mn Laves phase (abstract, column 2 lines 61-62) hydrogen storage alloy that falls within the presently claimed ranges (Nakamura at example 11, see also example 11a). Nakamura broadly teaches a composition- $Ti_{1-x-z}\alpha_z Y_x Mn_{y-w}\beta_w$, which is equivalent to $Ti_{0.4-0.95}Zr_{0-0.4}Y_{0.05-0.2}Mn_{0.75-2}\beta_{0-1}$ where beta= V, Cr, Ni, Fe, and/or Al (column 6 lines 44-49). This composition is listed in Table 7 in atomic%.

element	ratio	at%
Ti	0.9	30.0%
Mn	1.7	56.7%
Zr	0.1	3.3%
V	0.3	10.0%
total	3	100.0%

Table 6 (Nakamura example)

	given ratios		atomic%	
element	min.	max.	min at%	max. at%
Ti	0.4	0.95	10.0%	54.3%
Mn	0.75	2	22.7%	81.6%
Zr (alpha)	0	0.4	0.0%	25.0%
beta	0	1	0.0%	45.5%
Y	0.05	0.2	1.1%	14.8%

Table 7 (Nakamura broad range)

Therefore it is apparent that the composition taught by Nakamura falls within the instant ranges (claims 1 and 2).

Concerning dependent claim 3, where X ranges 0.1-0.2:

given numbers	min	max
Q	0.9	1.1
X	0.1	0.2
Y	0.3	1.8
Z	1.8	2.1

	ratios		atomic%	
element	min.	max.	min at%	max. at%
Ti	0.7	1	15.6%	71.4%
Mn	0	1.8	0.0%	62.1%
Zr	0.1	0.2	2.1%	16.7%
A	0.3	1.8	9.1%	69.2%

Table 2 (alloy from claim 3)

Concerning dependent claim 4, where X ranges 0.1-0.15:

given numbers	min	max
Q	0.9	1.1
X	0.1	0.15
Y	0.3	1.8
Z	1.8	2.1

	ratios		atomic%	
element	min.	max.	min at%	max. at%
Ti	0.75	1	16.7%	71.4%
Mn	0	1.8	0.0%	61.0%
Zr	0.1	0.15	2.1%	12.5%
A	0.3	1.8	9.2%	67.9%

Table 3 (alloy from claim 4)

Concerning dependent claims 7 and 8, as stated above, Nakamura teaches that said alloy is a C14 (AB2) type of hydrogen storage alloy.

Concerning dependent claim 23, Nakamura teaches that said alloy can be in powder form (column 4 lines 13-15).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura.

As stated above, Nakamura teaches the following composition ranges-

	given ratios		atomic%	
element	min.	max.	min at%	max. at%
Ti	0.4	0.95	10.0%	54.3%
Mn	0.75	2	22.7%	81.6%
Zr (alpha)	0	0.4	0.0%	25.0%
beta	0	1	0.0%	45.5%
Y	0.05	0.2	1.1%	14.8%

Table 7 (Nakamura broad range)

Therefore it is apparent that the composition substantially overlaps the presently claimed alloying ranges (instant claims 1-6, 9-22, see Table(s) below for instant claim ranges converted to at%). Nakamura teaches motivation to select the particular elements Cr, Ni, Al, V, and/or Fe (see column 3 lines 17-33). More particularly, the partial replacement of Mn by V or Fe is effective for controlling the equilibrium hydrogen pressure (column 3 lines 20-21), and the

partial replacement of Mn by Cr, Ni, and/or Al is effective in improving the hystersis and plateau pressure (column 3 lines 20-21, 25-28).

Concerning claims 9-22:

	Ti	Zr	Mn	V	Ni	Cr	Fe	Al
9	29.9%	3.3%	43.2%	15.0%	8.6%	0.0%	0.0%	0.0%
10	26.6%	6.6%	41.5%	13.3%	0.0%	10.0%	2.0%	0.0%
11	26.6%	6.6%	41.5%	13.3%	0.0%	0.0%	12.0%	0.0%
12	23.6%	10.1%	50.5%	10.1%	5.7%	0.0%	0.0%	0.0%
13	26.6%	6.6%	43.2%	15.0%	8.6%	0.0%	0.0%	0.0%
14	31.6%	1.7%	43.2%	15.0%	8.6%	0.0%	0.0%	0.0%
15	30.0%	3.3%	42.7%	10.0%	5.7%	8.3%	0.0%	0.0%
16	26.7%	6.7%	43.7%	8.3%	4.7%	10.0%	0.0%	0.0%
17	30.0%	3.3%	20.0%	6.7%	4.0%	36.0%	0.0%	0.0%
18	26.7%	6.7%	43.7%	8.3%	0.0%	10.0%	4.7%	0.0%
19	28.0%	5.0%	42.7%	8.3%	0.0%	6.0%	8.3%	2.0%
20	28.3%	5.0%	50.0%	10.0%	0.0%	0.0%	7.7%	2.0%
21	29.0%	4.3%	43.0%	5.7%	0.0%	6.0%	8.0%	2.0%
22	29.0%	4.3%	41.0%	5.3%	0.0%	5.7%	7.7%	2.0%

Table 8 (instant claims 9-22)

Overlapping ranges have been held to be a prima facie case of obviousness, see MPEP § 2144.05, *In re Best* 195 USPQ 430, *In re Malagari*, 182 USPQ 549, *In re Titanium Metals Corporation of America v. Banner*, 227 USPQ 773 (Fed. Cir 1985), *In re Woodruff*, 16 USPQ 2d 1934, and *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). Because the prior art of Nakamura teaches an overlapping alloy composition, it is held that Nakamura has created a prima facie case of obviousness of the presently claimed invention.

Concerning dependent claims 7 and 8, as stated above, Nakamura teaches that said alloy is substantially a C14 (AB2) Laves phase type crystal structure (abstract, column 2 lines 61-62).

Concerning dependent claim 23, Nakamura teaches that said alloy can be in powder form (column 4 lines 13-15).

6. Claims 24-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura or Bernauer et al or Hydride Database or Fetcendo et al (US 5,536,591 A) in view of Venkatesan et al (US 4,728,586 A).

Concerning claims 24 and 25, Venkatesan et al further teaches that the hydrogen storage alloy powder is pressed or sintered into "the porous metal substrate" (column 5 lines 18-22), in order to form the negative electrode. Said porous metal substrate includes mesh, grid, matte, foil, foam, plate, and expanded metal made out of copper, copper plated nickel or Cu-Ni alloy (column 6 lines 3-4, 9), as presently claimed in claims 26-28. The negative electrode is applicable to prismatic, jelly-rolled, and other battery configurations known to one of ordinary skill in the art (column 7 lines 54-55), as presently claimed in claims 29 and 30. Because both Nakamura (or Bernauer et al or Hydride Database) and Venkatesan et al are drawn to hydrogen storage alloys useful in energy storage for vehicles, it would have been obvious to one of ordinary skill in the art to use the electrode fabrication process, as taught by Venkatesan et al, with the TiMnZr alloy with improved hydrogen absorption ability (Nakamura at column 1 lines 49-57, Fetcendo at column 7 lines 1-3).

7. Claims 1-8 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fetcendo et al (US 5,536,591 A).

Fetcendo teaches a hydrogen storage alloy comprising (in at%): 0.1-60% Ti, 0.1-40% Zr, 0-60% V, 0.1-57% Ni, 0-56% Cr, 13-17% Mn (column 11 lines 25-32, column 12 lines 5-14), which overlaps the presently claimed composition in instant claims 1-6 (see Table 9 below for summary of instant alloying ranges in at%).

Because the prior art of Fetcendo teaches an overlapping alloy composition, it is held that Fetcendo has created a prima facie case of obviousness of the presently claimed invention.

Concerning dependent claims 7 and 8, as stated above, Fetcendo teaches that said alloy can have a Laves phase type crystal structure (abstract, column 10 line 61). Though Fetcendo does not mention that said alloy is a single phase material, because Fetcendo teaches a substantially overlapping alloy composition, the examiner asserts that "products of identical chemical composition can not have mutually exclusive properties." *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). If the prior art teaches the identical chemical structure, the properties applicant discloses and/or claims (such as metallurgical structure) are expected to be necessarily present. See MPEP 2112.01.

Concerning dependent claim 23, Fetcendo teaches that said alloy can be in powder form (column 7 line 31, column 15 lines 59-67).

Double Patenting

8. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

9. Claims 1-8 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-13 of U.S. Patent No. 6,270,719 B1 or claims 1-11 of U.S. Patent No. 6,517,970 B1.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of US'719 teach a hydrogen storage alloy consisting of (in at%) 0.1-60% Ti, 0.1-40% Zr, 0<V<60%, 0.1-57% Ni, 5-22% Mn, 0<Cr<56, Sn, Al, Co and optionally Fe (see claim 1, etc.), which substantially overlaps the instant alloying ranges (see Table 9 for alloying ranges in atomic % of instant claims 1, 3-6). The claims of US'970 teach a hydrogen storage alloy consisting of (in at%) 29-35% Ti, 0.5-10% Zr, 10-15%V, 13-20% Cr, 32-38% Mn, 1.5-3% Fe, 0.05-0.5% Al (see claim 1, etc.), which substantially overlaps the instant alloying ranges (see above Tables for alloying ranges in atomic % of instant claims 1, 3-6).

	claim 1		claim 3		claim 4		claim 5		claim 6	
element	min at%	max. at%	min at%	max. at%	min at%	max. at%	min at%	max. at%	min at%	max. at%
Ti	12.2%	78.6%	15.6%	71.4%	16.7%	71.4%	15.3%	64.7%	16.7%	61.1%
Mn	0.0%	67.9%	0.0%	62.1%	0.0%	61.0%	0.0%	56.6%	0.0%	52.8%
Zr	0.0%	29.2%	2.1%	16.7%	2.1%	12.5%	0.0%	23.3%	0.0%	21.9%
A	8.5%	76.6%	9.1%	69.2%	9.2%	67.9%	16.9%	68.6%	19.7%	64.5%

Table 9: Consolidated Table of instant alloying ranges in at%

The claims of US'719 and US'970 do not teach said alloy is a single phase material or said alloy exhibits a hexagonal C14 laves phase. However, the examiner asserts that "products of identical chemical composition can not have mutually exclusive properties." *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). A chemical composition and its properties are inseparable. Where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical

processes, a prima facie case of either anticipation or obviousness has been established. In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). Therefore, if the prior art teaches the identical chemical structure, the properties applicant discloses and/or claims (such as metallurgical structure) are expected to be necessarily present. See MPEP 2112.01.

Because the claims of US'719 or US'970 teaches a substantially overlapping alloy composition, the rejection is deemed proper.

10. Claims 23-30 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-13 of U.S. Patent No. 6,270,719 B1 or claims 1-11 of U.S. Patent No. 6,517,970 B1 in view of Venkatesan et al (US 4,728,586 A).

Concerning claims 23-25, Venkatesan et al further teaches that the hydrogen storage alloy powder is pressed or sintered into "the porous metal substrate" (column 5 lines 18-22), in order to form the negative electrode. Said porous metal substrate includes mesh, grid, matte, foil, foam, plate, and expanded metal made out of copper, copper plated nickel or Cu-Ni alloy (column 6 lines 3-4, 9), as presently claimed in claims 26-28. The negative electrode is applicable to prismatic, jelly-rolled, and other battery configurations known to one of ordinary skill in the art (column 7 lines 54-55), as presently claimed in claims 29 and 30. Because both the claims of US'719 or US'970 and Venkatesan et al are drawn to hydrogen storage alloys useful in energy storage for vehicles, it would have been obvious to one of ordinary skill in the art to use the electrode fabrication process, as taught by Venkatesan et al, with the TiMnZr alloy taught by the claims of US'719 or US'970.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Janelle Combs- Morillo whose telephone number is (703) 308-4757. The examiner can normally be reached Monday through Friday from 7:30am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King, can be reached on (703) 308-1146. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9310.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

GEORGE WYSZOMIERSKI
PRIMARY EXAMINER

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March 17, 2003